Jump-robust estimation of the integrated covariance matrix

K. Boudt[1,2], C. Croux[1], and S. Laurent[3]

[1] K.U.Leuven, Belgium
[2] Lessius University College, Belgium
[3] Maastricht University, The Netherlands

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We look at separately estimating the daily realized volatility of the continuous and jump components in the price series. In their seminal paper "Power and bipower variation with stochastic volatility and jumps", Ole Barndorff-Nielsen and Neil Shephard (2004) proposed the realized bipower variation as a jump-robust estimator of daily volatility. It is defined as the sum of products of two contiguous absolute returns. We show that this estimator has an unbounded influence function and zero breakdown point. Moreover, its multivariate extension is not positive semidefinite nor affine equivariant. We introduce the univariate and multivariate versions of the Realized Outlyingness Weighted Quadratic Covariation (ROWQCov). The new estimator is a weighted sum of outer products of high-frequency returns and downweights returns that, because of jumps or other reasons, are outliers under the Brownian SemiMartingale model. Under this model the ROWQCov is consistent for the integrated covariance matrix and more efficient than the realized bipower variation. The estimator is affine equivariant and yields positive semidefinite matrices. It has a bounded influence function and 50% breakdown point. We illustrate this method on 5-minute returns of stock prices and exchange rates.